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EFFECT OF OLD WOOD SIZE ON BUD BEHAVIOUR, YIELD AND BERRY QUALITY OF FLAME SEEDLESS GRAPE

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ABSTRACT

This investigation was carried out during two seasons 1999 and 2000 in a private orchard located at Dakahlia Governorate to study the effect of old wood size on bud behaviour, yield and berry quality of Flame seedless grape. The obtained data indicated that the high and medium levels of old wood size increased bud burst percentage, fruitful buds, number of cluster per vine, yield, cluster weight, berries weight , size, weight of berries per cluster and average weight of rachis/cluster.

On the other hand, high and medium levels decreased berries number of cluster, compactness factor and berry index. Moreover, no differences were found between medium and high levels of old wood size.

Concerning the effect of old wood size on fertility coefficient percentage, cluster length, percentage of berries per cluster, cluster index, juice volume, TSS, acidity and TSS/acidity no significant differences were found as affected by old wood size in this respect..

INTRODUCTION

Recently in Egypt, Flame seedless grape area greatly increased in the last few years, especially in the newly reclaimed lands. This cultivar is considered most popular and favourite table grape for European consumer because it ripens early in the beginning of the harvest season. Therefore, Flame seedless considered as an important cultivar for exportation in European market. Since, containing a higher percent of anthocyanine with best berry quality.

Many investigators mentioned that high stem and training system had a great effect on yield and berry quality (Draganov, 1969; Popov *et al.,* 1969; Radulov *et al.,* 1972; Rangelov and Boichev, 1977; Namozov and Gvseinov, 1983; Cimaco and Chaves, 1984; Tomer and Brar, 1984; Reynolds *et al.,* 1985; Hassan *et al.,* 1991; Popescu 1994 and Tardea *et al.,* 1996).

Popvo *et al.* (1969) and Hassan *et al.* (1991) indicated that size of old wood reservoir for storing nutritive substances and connective pathway for water, mineral, salts and assimilates during growing season. Thus, this investigation was carried out to study the effect of old wood size on bud behaviour, yield and berry quality of Flame seedless grape.

MATERIALS AND METHODS

This investigation was carried out during 1999 and 2000 seasons on Flame seedless grapes. The vines were 12 years old planted at 2 x 2.5 m, trained as cordon methods and growing in clay soil with drip irrigation located at Minia Samanoud, Dakahlia Governorate. All vines were received to the normal cultural practices. At winter, pruning vine load was fixed to 60 bud per vine.

Size of old wood was divided into three levels (low, medium and high). Size of old wood was determined for all the above ground parts of the vine which included trunk, cordon and all units of more than one year old.

Circumference and length of these units were measured and the total size were then calculated according to the following equation by Hassan *et al.* (1991):

$$S = \pi \times D^2 \times L$$

Whereas S is the total size of old wood

π is constant which equals 3.14

L is length of the measured part.

D is dimension of the measured part.

Size of separated old wood parts were added to each vine.

From this point of view we can obtained to classify vines to three levels:

a- Low: old wood size as 110 - 160 Dec^3

b- Medium as 161 - 210 Dec^3

c- High as 211 - 260 Dec^3

The following characteristics were investigated for each vines:

Bud behaviour:

Number and percentage of bursted buds were counted and calculated

$$\text{Bud bursted \%} = \frac{\text{Number of bursted buds per vine}}{\text{total buds per vine}} \times 100$$

$$\text{Fruitful buds \%} = \frac{\text{Number of fruitful buds per vine}}{\text{Number of bursted buds per vine}} \times 100$$

The fertility coefficient was calculated by dividing the number of clusters by the number of total buds left on the vine as mentioned by Kamel *et al.* (1965).

Yield and berry quality:

At harvest, when TSS reached about 18.0% according to Tourky *et al.* (1995), yield per vine and cluster weight and length were determined as well as compactness coefficient was determined by dividing the number of berries per cluster by cluster length according to Weaver (1962). Also, berry weight, size and juice volume of berries were also estimated.

Percentage of berries/cluster, average weight of rachis/cluster, cluster index (average weight of berries per cluster divided by average weight of rachis) berry index (average number of berries per 100 gram of cluster), TSS, acidity and TSS/acid ratio were also determined. The obtained data were statistically analyzed according to Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

Effect of old wood size on:

- Bud behaviour and No. of branches /vine:

Data presented in Table (1) indicated that the medium and high levels of old wood size significantly increased bud burst percentage than the low

level. These results may be due to the higher content of water and nutritional substances stoned on the old wood resulted in favourable water and nutritive balance in early spring. No significant differences were found between medium and high levels of old wood size in the two seasons under the study. Our data go in line with those reported by Nikov (1962), Draganov (1969), Popov *et al.* (1969), Reynolds *et al.* (1985) and Hassan *et al.* (1991).

Concerning the effect of fruitful buds, the data in the same table took nearly similar trend as bud burst percentage.

From the same table, no significant effect due to old wood size on fertility coefficient. Hassan *et al.* (1991) mentioned that old wood size did not affect fertility was detected coefficient.

Data also, revealed that high and medium levels of old wood size significantly increased average number of cluster per vine, this effect may be due to the increase of bud burst and fruitful buds. There was no significant difference between high and medium level in this respect.

- Yield and berry quality:

Concerning the effect of old wood size on yield per vine, the data presented in Table (2) indicted that both high and medium levels of old wood size were significantly increased yield than the low level. The values were (16.3, 21.1 and 21.3) and (15.9, 19.7 and 20.7) respectively in the two seasons under study. The data also revealed that no significant differences were observed between high and medium levels under this study. Our data go in line with this obtained by Namazov and Guseinov (1983), Fregons *et al.* (1984), Gusainov and Kruchinina (1984), Tomer and Brar (1984), Hassan *et al.* (1991), Cuharschi and Zelter (1994), Popescu (1994) and Tardea *et al.* (1996).

Data in Table (2) also revealed that the medium and high levels of old wood size significantly increased cluster weight. The heavy weight of cluster gained from medium and high levels of old wood size. The data also indicated that, no significant differences were observed between medium and high levels. The low level of old wood size gave the lowest cluster weight, the value reached about 460, 503 and 500 g/cluster and 450, 500 and 500 g/cluster for low, medium and high levels, respectively in the two seasons under the study.

Table 1: Effect of old wood size on bud behaviour and No. of branches /vine of Flame seedless grapes during 1999 and 2000 seasons.

Properties / Treatments	Bud burst %	Fruitful buds (%)	Fertility coefficient	No. of bunches/vine
1999				
Low (110 - 160) Dec^3	68.0	38.0	0.67	35.3
Medium (161 - 210) Dec^3	74.7	42.3	0.70	40.3
High (211 - 260) Dec^3	74.7	42.3	0.68	41.0
L.S.D. at 5%	5.61	2.77	NS	4.11
2000				
Low (110 - 160) Dec^3	66.3	44.3	0.67	35.3
Medium (161 - 210) Dec^3	72.2	50.5	0.66	40.0
High (211 - 260) Dec^3	74.3	50.2	0.69	41.0
L.S.D. at 5%	4.9	4.5	NS	2.56

Concerning the effect of old wood size on cluster length, the data revealed that no significant difference was found between the three levels of old wood size in the first seasons only, while in the second season of study, medium and high levels of old wood size gave the highest values in that respect comparing with low level.

Data in Table (2) revealed that cluster berries number was significantly decreased with increasing size of old wood. The same table cleared that cluster compactness was decreased as size of old wood increased. The high level of cluster compactness was obtained from low level of old wood size in the two seasons under the study. Our data go in line with those obtained by Hassan *et al.* (1991).

Table 2: Effect of old wood size on yield, cluster weight, length, berries number of cluster and compactness factor on Flame seedless grapes during 1999 and 2000 seasons.

Properties / Treatments	Yield/ Vine (kg)	Cluster weight (gm)	Cluster length (cm)	Berries No./ cluster	Compactness factor
1999					
Low (110 - 160) Dec^3	16.3	460.0	32.0	202.0	6.3
Medium (161 - 210) Dec^3	21.1	503.3	33.0	192.0	5.8
High (211 - 260) Dec^3	21.3	500.0	33.3	192.0	5.8
L.S.D. at 5%	1.99	23.9	NS	6.55	0.43
2000					
Low (110 - 160) Dec^3	15.9	450	33.3	196	6.4
Medium (161 - 210) Dec^3	19.7	500	34.3	185	5.9
High (211 - 260) Dec^3	20.7	500	34.7	187	5.9
L.S.D. at 5%	1.7	13.1	1.2	7.6	0.26

Data presented in Table (3) indicated that berries weight per cluster and average rachis weight per cluster were significantly increased as the size of old wood size increased. Medium and high levels of old wood size gave the highest value in this respect. Our data go in line with those obtained by Hassan *et al.* (1991).

Data in the same table indicated that no significant effect was noticed between the three levels of old wood size on percentage of berries /cluster, percentage of rachis per cluster and cluster index during the two seasons of study.

Concerning the effect of old wood size on berry index, data in Table (3) indicated that medium and high levels of old wood size decreased berry index. The low level of old wood size gave the highest value of berry index. Our data are in agreement with those reported by Hassan *et al.* (1991).

Table 3: Effect of old wood size on average weight of berries/ cluster, average weight of rachis/cluster, berries percentage/cluster, rachis percentage, cluster index, berry index of Flame seedless grapes during 1999 and 2000 seasons.

Properties / Treatments	Av. Weight of berries/ cluster	Av. Weight of rachis/ cluster	Berries percentage /cluster	Rachis percentage	Cluster index	Berry index
1999						
Low (110 - 160) Dec^3	341.7	23.0	94.9	5.9	18.76	43.6
Medium (161 - 210) Dec^3	475.7	28.0	93.9	5.9	17.97	37.9
High (211 - 260) Dec^3	474.7	26.0	93.5	5.8	18.23	38.2
L.S.D. at 5%	10.60	2.60	N.S.	N.S.	N.S.	2.62
2000						
Low (110 - 160) Dec^3	427	23.0	94.9	5.1	19.1	43.7
Medium (161 - 210) Dec^3	474	26.0	94.8	5.2	18.5	37.0
High (211 - 260) Dec^3	474	26.0	94.2	5.8	18.7	37.3
L.S.D. at 5%	2.07	2.05	NS	NS	NS	0.71

Concerning the effect of old wood size on berries weight and size, data presented in Table (4) indicated that the medium and high levels of old wood size significantly increased berries weight and size. The data also revealed that no significant differences were found between medium and high levels. Hassan *et al.* (1991) mentioned that the highest value of berries weight and size gained from the high and medium levels of old wood size in Italia grape variety.

Concerning berries juice volume, it is obvious from Table (4) that no significant differences were found between the three levels of old wood size in this respect.

Table 4: Effect of old wood size on berries size, berries weight and juice volume of Flame seedless grapes during 1999 and 2000 seasons.

Properties / Treatments	Berries weight (kg)	Berries size (mm)	Juice volume (ml^3)
1999			
Low (110 - 160) Dec^3	218.0	207.0	73.3
Medium (161 - 210) Dec^3	249.0	240.0	73.0
High (211 - 260) Dec^3	248.0	240.0	73.7
L.S.D. at 5%	21.6	32.7	NS
2000			
Low (110 - 160) Dec^3	223.3	221.7	75.0
Medium (161 - 210) Dec^3	255.0	245.0	75.7
High (211 - 260) Dec^3	253.3	245.0	75.7
L.S.D. at 5%	22.5	32.3	NS

It is obvious from Table (5) that no significant differences in total soluble solids, acidity and TSS/acid ratio in the two seasons under the study as affected by old wood size. These results are in agreement with the findings of Namazov and Guseinov (1983) and Hassan *et al.* (1991).

From the aforementioned results, data indicated that old wood size has an important influence on bud burst, fruitful buds percentage, yield and berry quality of Flame seedless grape the high and the medium levels of old wood size gave the best results in this respect.

Table 5: Effect of old wood size on TSS, acidity and TSS/acid ratio of Flame seedless grapes during 1999 and 2000 seasons.

Properties / Treatments	TSS (%)	Acidity (%)	TSS/acid ratio
1999			
Low (110 - 160) Dec^3	18.0	0.73	24.7
Medium (161 - 210) Dec^3	18.5	0.74	25.0
High (211 - 260) Dec^3	18.3	0.72	25.4
L.S.D. at 5%	NS	NS	NS
2000			
Low (110 - 160) Dec^3	18.2	0.74	25.0
Medium (161 - 210) Dec^3	18.3	0.73	25.1
High (211 - 260) Dec^3	18.3	0.73	25.1
L.S.D. at 5%	NS	NS	NS

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تأثير حجم الخشب المسن على سلوك البراعم والمحصول وجودة الثمار للعنب الفليم سيدلس

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أجرى هذا البحث خلال موسمى 1999 و 2000 بمزرعة خاصة بمحافظة الدقهلية على العنب الفليم سيدلس والمربى بالتربية الكردونية فى تربة طميية وتحت نظام الرى بالتنقيط. وقد تم تثبيت عدد العيون على الكرمات 60 عين.

وقد كان الهدف من هذه الدراسة معرفة تأثير حجم الخشب المسن على سلوك البراعم والمحصول وجودة الثمار.

وقد تم أخذ قياسات الخشب المسن وتقدير حجمه وقسم إلى ثلاث مستويات (معاملات):

1- مستوى منخفض (110 - 160 ديسمتر^3)
2- مستوى متوسط (161 - 210 ديسمتر^3)
3- مستوى مرتفع (211 - 260 ديسمتر^3)

وقد أوضحت الدراسة أن المستوى المرتفع والمتوسط من حجم الخشب المسن زاد من نسبة تفتح البراعم ونسبة البراعم الزهرية وعدد العناقيد على الكرمة وكذلك زيادة المحصول ووزن العنقود ووزن وحجم الحبات. وزاد أيضاً متوسط وزن الحبات بالعنقود. وعلى العكس من ذلك فقد قل عدد الحبات ومعامل التزاحم وكذلك دليل الحبات.

ومن هذه الدراسة اتضح أيضاً أنه لا توجد فروق معنوية بين المستوى المتوسط والمستوى العالى من حجم الخشب المسن على سلوك البراعم والمحصول وصفاته.

أما معامل الخصوبة وطول العنقود ونسبة الحبات بالعنقود والشمراخ بالعنقود ودليل العنقود وكمية العصير بالحبات والمواد الصلبة الكلية والحموضة فلم تتأثر هذه الصفات بحجم الخشب المسن ولم توجد فروق معنوية لهذه الصفات.

ومن هذه الدراسة يتضح أهمية الخشب المسن فى زيادة نسبة تفتح البراعم وزيادة المحصول للفدان وكذلك تحسين جودة العنقود.

لذلك يوصى بالتوسع بزراعة أصناف العنب الصالحة للتصدير وتربيتها وتدعيمها بالطرق الحديثة مثل نظام البارون وتكاعيب جنوب أفريقيا حيث تمتاز هذه الطرق بزيادة حجم الخشب القديم على الكرمات.